What is claimed is:

1. A method for preventing damage to an anti-reflective structure during removing an overlying photoresist layer, comprising the steps of:

forming a nitrogen-free silicon oxide layer having a refractive index of 1.4~1.7 overlying the anti-reflective structure to serve as a protective layer;

forming a patterned photoresist layer overlying the nitrogen-free silicon oxide layer; and

removing the patterned first photoresist layer.

2. The method as claimed in claim 1, wherein the anti-reflective layer contains no nitrogen.

3. The method as claimed in claim 1, wherein the anti-reflective structure consists at least one silicon oxynitride layer.

4. The method as claimed in claim 1, wherein the nitrogen-free silicon oxide layer is formed by plasma enhanced chemical vapor deposition.

5. The method as claimed in claim 4, wherein the nitrogen-free silicon oxide layer is formed from SiH_4 and CO_2.

6. The method as claimed in claim 1, wherein the nitrogen-free silicon oxide layer has a thickness of about 10~500 Å.

1. A method for preventing damage to an anti-reflective structure during removing an overlying photoresist layer, comprising the steps of:

forming a nitrogen-free silicon oxide layer having a refractive index of 1.4~1.7 overlying the anti-reflective structure to serve as a protective layer;

forming a patterned photoresist layer overlying the nitrogen-free silicon oxide layer; and

removing the patterned first photoresist layer.

2. The method as claimed in claim 1, wherein the anti-reflective layer contains no nitrogen.

3. The method as claimed in claim 1, wherein the anti-reflective structure consists at least one silicon oxynitride layer.

4. The method as claimed in claim 1, wherein the nitrogen-free silicon oxide layer is formed by plasma enhanced chemical vapor deposition.

5. The method as claimed in claim 4, wherein the nitrogen-free silicon oxide layer is formed from SiH_4 and CO_2.

6. The method as claimed in claim 1, wherein the nitrogen-free silicon oxide layer has a thickness of about 10~500 Å.

7. The method as claimed in claim 1, wherein the nitrogen-free silicon oxide layer has an extinction coefficient of about 0~0.5.

8. The method as claimed in claim 7, wherein the nitrogen-free silicon oxide layer is a silicon dioxide layer.

9. The method as claimed in claim 7, wherein the nitrogen-free silicon oxide layer is a silicon oxycarbide layer.

10. A method for preventing damage to an anti-reflective structure during removing an overlying photoresist layer, comprising the steps of:

in-situ formation of a nitrogen-free silicon oxide layer having a refractive index of 1.4~1.7 and an extinction coefficient of 0~0.5 overlying a nitrogen-free dielectric anti-reflective structure to serve as a protective layer;

forming a patterned photoresist layer overlying the nitrogen-free silicon oxide layer; and

removing the first patterned photoresist layer.

11. The method as claimed in claim 10, wherein the nitrogen-free silicon oxide layer is in-situ formed by plasma enhanced chemical vapor deposition.

12. The method as claimed in claim 11, wherein the nitrogen-free silicon oxide layer is formed from SiH_4 and CO_2.

13. The method as claimed in claim 10, wherein the nitrogen-free silicon oxide layer has a thickness of about 10~500 Å.

14. The method as claimed in claim 10, wherein the nitrogen-free silicon oxide layer is a silicon dioxide layer.

15. The method as claimed in claim 10, wherein the nitrogen-free silicon oxide layer is a silicon oxycarbide layer.

16. A semiconductor device for preventing damage to an anti-reflective structure during removing an overlying photoresist layer, comprising:

a nitrogen-free dielectric anti-reflective structure disposed overlying a substrate; and

a nitrogen-free silicon oxide layer having a refractive index of 1.4~1.7 disposed overlying the nitrogen-free anti-reflective layer to serve as a protective layer.

17. The semiconductor device as claimed in claim 16, wherein the nitrogen-free silicon oxide layer has an extinction coefficient of about 0~0.5.

18. The semiconductor device as claimed in claim 17, wherein the nitrogen-free silicon oxide layer is a silicon dioxide layer.

19. The semiconductor device as claimed in claim 17, wherein the nitrogen-free silicon oxide layer is a silicon oxycarbide layer.

20. The semiconductor device as claimed in claim 16, wherein the nitrogen-free silicon oxide layer has a thickness of about 10~500 Å.